UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte EUEE-SEON JANG, SUNG-JIN KIM, MUN-SUP SONG, MAHN-JIN HAN, YANG-SEOCK SEO, and SEOK-YOON JUNG

Appeal No. 2006-2486
Application No. 09/396,470

HEARD ON OCTOBER 19, 2006

Before KRASS, MACDONALD, and HOMERE, ***Administrative Patent Judges***.

HOMERE, ***Administrative Patent Judge***.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1 through 6, 10, 12 through 15 and 19. Claims 9, 18 and 20 stand allowed. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 7, 8, 16 and 17 are cancelled. Claims 1 through 6, 9 through 15, 18 through 20 are pending in this application.

We affirm.

Invention

Appellants' invention relates generally to a method and apparatus for progressively coding and decoding three-dimensional (3D) mesh information. First, a 3D mesh object layer analyzer (201) receives a 3D mesh and divides said mesh into a plurality of mesh components, each component corresponding to a different partition of the 3D mesh. The mesh components are then fed into a plurality of mesh coders (202) that independently code the plurality of mesh components in such a way to allow the mesh components to be independently decoded. Further, each resulting mesh component includes connectivity information, geometry information and photometry information, which are necessary to reconstruct the coded mesh components, as well as to incrementally reproduce said components as unit mesh parts of the 3D mesh. The coded mesh components are then fed into a multiplexer (204) that generates a compressed bit stream, which is subsequently transmitted to a decoding unit (209) that includes a de-multiplexer (205), a plurality of component decoders (206) and data synthesizer (208).

Claims 1 and 2 are representative of the claimed invention and are reproduced as follows:

> 1. A progressive 3-D mesh information coding method comprising the steps of:
>
> (a) dividing a 3-D mesh into a plurality of mesh components, wherein each of the mesh components corresponds to a different partition of the 3-D mesh;

(b) coding each of the plurality of mesh components, wherein the plurality of coded mesh components are capable of being independently decoded and incrementally reproduced as unit mesh parts of the 3-D mesh; and

(C) multiplexing the plurality of coded mesh components into a compressed bit stream and transmitting the compressed bit stream.

2. A progressive 3-D mesh information coding method comprising the steps of:

(a) dividing a 3-D mesh into a plurality of mesh components, wherein each of the mesh components corresponds to a different partition of the 3-D mesh;

(b) coding each of the plurality of mesh components; and

(C) multiplexing the plurality of coded mesh components into a compressed bit stream and transmitting the compressed bit stream, wherein each of the plurality of mesh components includes at least connectivity information, geometry information and photometry information which are necessary to reconstruct the coded mesh components thenselves.

References

The Examiner relies on the following references:

Bajaj et al. (Bajaj)	6,438,266	Aug. 20, 2002 (Filed on Aug. 26, 1999)
Bajaj et al. (priority document)	60/098,150	Prov. Appl. (Filed on Aug. 27, 1998)

Rejections at Issue

A. Claim 2 stands rejected under 35 U.S.C. § 102 as being anticipated by Bajaj.

B. Claims 1, 3 through 6, 10, 12 through 15 and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Bajaj.

Rather than reiterate the arguments of Appellants and the Examiner, the opinion refers to respective details in the Briefs[1] and the Examiner's Answer[2]. Only those arguments actually made by Appellants have been considered in this decision. Arguments that Appellants could have made but chose not to make in the Briefs have not been taken into consideration. See 37 CFR 41.37(c)(1)(vii)(eff. Sept. 13, 2004).

OPINION

In reaching our decision in this appeal, we have carefully considered the subject matter on appeal, the Examiner's rejections, the arguments in support of the rejections and the evidence of anticipation and obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration Appellants' arguments set forth in the Briefs along with the Examiner's rationale in support of the rejections and arguments in the rebuttal set forth in the Examiner's Answer.

After full consideration of the record before us, we agree with the Examiner that claim 2 is properly rejected under 35 U.S.C. § 102 as being anticipated by Bajaj. We also agree with the Examiner that claims 1, 3 through 6, 10, 12 through 15 and 19

[1] Appellants filed an Appeal Brief on October 3, 2005. Appellants filed a Reply Brief on March 13, 2006.
[2] The Examiner mailed an Examiner's Answer on January 11, 2006. The Examiner mailed an office communication on May 30, 2006 stating that the Reply Brief has been entered and considered.

are properly rejected under 35 U.S.C. § 103 as being unpatentable over Bajaj. Accordingly, we affirm the Examiner's rejections of claims 1 through 6, 10, 12 through 15 and 19 for the reasons provided in the Examiner's Answer, as further expanded upon in this opinion, and for the reasons set forth **infra**.

I. Under 35 U.S.C. § 102(e), is the Rejection of claim 2 as Being Anticipated By Bajaj Proper?

It is axiomatic that anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim. **See In re King**, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986) and **Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.**, 730 F.2d 1452, 1458, 221 USPQ 481, 485 (Fed. Cir. 1984).

With respect to representative claim 2, Appellants argue[3] in the Appeal and Reply Briefs that the Bajaj reference does not disclose the limitation of multiplexing a plurality of mesh components into a compressed bit stream wherein each mesh component includes photometry information. Appellants also argue that the Bajaj patent does not teach the limitation of

[3] Appellants argued at the Oral Hearing held on October 19, 2006 that the Bajaj patent does not qualify as prior art since the teaching of independently coding geometric primitives for the two kinds of contours (vertex and triangle) disclosed at column 4, lines 3 through 5 of the patent is nowhere disclosed in the priority document. Appellants also argued that the prior art of record does not teach mesh components as claimed. Additionally, Appellants argued that the prior art of record teaches a decoding scheme wherein the decoding of a mesh relies upon the decoding of a previous mesh. Therefore, according to Appellants, Bajaj teaches away from the claim limitation of independently decoding the mesh components.

'independently decoding in connection with incremental reproduction of unit mesh part'. Additionally, Appellants argue that even if such teachings were disclosed in the Bajaj patent, it would not qualify as prior art against the claimed invention since the Bajaj priority document does not contain such teachings.

To determine whether claim 2 is anticipated, we must first determine the scope of the claim. We note that representative claim 2 reads in part as follows:

> [M]ultiplexing the plurality of coded mesh components into a compressed bit stream and transmitting the compressed bit stream, wherein each of the plurality of mesh components include at least connectivity information, geometry information and photometry information which are necessary to reconstruct the coded mesh components themselves.

At page 6, lines 17 through 21, Appellants' specification states the following:

> [R]eferring to FIG. 2, the 3-D mesh object (MO) can be comprised of mesh object layers (MOLs) obtained by dividing information in the mesh into layers. Here, each MOL includes one or more mesh components (MCOM)includes connectivity information, geometry information, and other information such as photometry information.

Further, at page 7, lines 8 through 15, Appellants' specification states the following:

> [R]eferring to FIG. 3, first, a 3-D mesh object (MO) 100 is reconstructed into a plurality of mesh components (MCOM)by the 3-D data analyze 201, and the plurality of mesh components are input to the plurality of first through N-th component coders 202, respectively. Here, several mesh components (MCOM) can constitute an MOL. Each of he MCOMs is compressed by a corresponding component coder 202, and the compressed bit steams are multiplexed by the MUX 204 and transmitted. Here, MOL or MCOM information 203 used in an already-operated component coder can be used in a component coder not yet operated.

Thus, representative claim 2 does require multiplexing a plurality of mesh components into a compressed bit stream wherein each mesh component includes photometry information. We note, however, that claim 2 neither recites nor requires the limitation of independently decoding in connection with incremental reproduction of unit mesh part. Consequently, Appellants' arguments with regard to this limitation do not have any basis in representative claim 2, and will not be afforded any patentable weight. **See In re Hiniker Co.**, 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998).

Our reviewing court states in **In re Zletz**, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) that "claims must be interpreted as broadly as their terms reasonably allow." Further our reviewing court states, "[t]he terms used in the claims bear a 'heavy presumption' that they mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art." **Texas Digital Sys. Inc v.**

Telegenix Inc., 308 F.3d 1193, 1202, 64 USPQ2d 1812, 1817 (Fed. Cir. 2002). Upon review of Appellants' specification, we fail to find any particular definition of the term "photometry" that is different from the ordinary meaning. Appellants' specification merely indicates that the mesh component includes connectivity information, geometry information, and other information such as photometry information. We find that the ordinary meaning of the term "photometry" is best found in the dictionary. We also note that the definition most suitable for "photometry" is consistent with the definitions provided by Appellants at pages 8 and 9 of the Appeal Brief[4]. We appreciate Appellants' position that limits "photometry" to luminous intensity or other properties of light. However, we find that the above definitions and the claim language do not preclude the reading of "photometry" to include information pertaining to color and texture. In fact, color and texture are, inter alia, properties of light. We thus find that the ordinarily skilled artisan would be readily apprised of the fact that by teaching properties of light such as color and texture among other characteristics to be embodied in the

[4] **American Heritage College Dictionary, Third Edition**, 2000 (page 1029) (defining photometry as the measurement of properties of light, especially luminous intensity). **IEEE Standard Dictionary of Electrical and Electronics Terms, Second Edition**, 1978, page 492) (defining photometry as the measurement of quantities referring to radiation evaluated according visual effect which it produces, as based on certain conventions."

encoding of the triangular meshes, Bajaj teaches the equivalent of photometry as part of its disclosed encoding scheme.

Now, the question before us is what Bajaj would have taught to one of ordinary skill in the art? To answer this question, we find the following facts:

1. At column 1, lines 25 through 28, Bajaj states the following:

> [D]igital representations of stationary 3-D objects typically consist of large numbers of discrete polygons, encoded by various methods to reflect location, geometric, connectivity, texture, and other surface characteristics. One of the promising current modeling processes involves the use of surface models made up of triangles.

2. At column 3, lines 54 through 57, Bajaj states the following:

> [I]n accordance with the invention a unique combination of compressing and encoding of both the topology (connectivity) and geometry (vertex coordinates) of arbitrary polygon meshes.

3. At column 4, lines 49 through 55, Bajaj states the following:

> [T]opology and geometry data obtained from a scanning of an object are encoded and a bit stream is created for progressive transmission in accordance with the teachings. The bit stream is transmitted through the network to a remote station where a decoder interprets and reconstitutes the encoded data. An image of the object is displayed on a monitor.

4. At column 9, lines 4 through 9, Bajaj states the following:

> FIG. 10 states the sequence of process steps described above, from the capture of the vertex mesh of 3-D video

images, including the separate encoding of generalized and exceptional triangle strips, and the alternately applying of the separate encodings in creating the transmitted signal.

5. At column 14, lines 61 through 64, Bajaj states the following:

As seen in the chart of FIG. 32, a given Object is coded as already described above. The coding may include topology, geometry, texture, normals, color, and more. Then, "Instances" of the Object, which are descriptions of a mesh, its vertices and connectivity, and referenced thereto, are created.

With the above discussion in mind, we find that with regard to representative claim 2, the Bajaj patent teaches a method for compressing and encoding the connectivity and geometry information of polygon meshes of 3D objects. Particularly, as depicted in figures 10, 3(a) through 3(c), Bajaj teaches the decomposition of a 3D object into a plurality of triangular meshes, each corresponding to a different partition of the 3D object, and each triangular mesh being encoded into a compressed bit stream for transmission, wherein such encoding scheme combines connectivity, geometry, texture information and other surface characteristics to thereby progressively reconstruct the 3D object. We also find that the Bajaj priority document does disclose such decomposition of 3D objects into triangular meshes that are encoded to reflect connectivity, geometry and texture and color characteristics, which are used to reconstruct the 3D object. See priority document at page 7, figures 2(a) through 2(c), pages 15, 18, 36 through 45. It is our view that one of

ordinary skill in the art at the time of the present invention would have readily found that Bajaj's teaching of encoding the different triangular meshes of a partitioned 3D object reflecting connectivity, geometry and color/texture characteristics amounts to the claimed limitation of multiplexing the mesh components of a 3D object into a compressed bit stream having connectivity, geometry and photometry components. The ordinarily skilled artisan would have duly recognized that Bajaj's teaching of alternately combining the encoded triangular meshes serves the same purpose of breaking down the 3D object into its components, which are compressed, multiplexed, encoded, transmitted, and ultimately reconstructed, as claimed. With regard to Appellants' argument (presented at the Oral Hearing) that the claimed mesh components are different from the triangular meshes disclosed in Bajaj, we are not persuaded that such differences actually exist. The record is devoid of any evidence to corroborate Appellants' position. It has been held that arguments of counsel are not evidence. See, e.g., **Meitzner v. Mindick**, 549 F.2d 775, 782, 193 USPQ 17, 22 (CCPA 1977); **In re Pearson**, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974). Consequently, we do not find error in the Examiner's stated position, which concludes that Bajaj teaches the limitation of multiplexing a plurality of mesh components into a compressed bit stream wherein each mesh component includes photometry information. It is therefore our

view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would have suggested to the ordinarily skilled artisan the invention as set forth in claim 2. Accordingly, we will sustain the Examiner's rejection of claim 2.

II. Under 35 U.S.C. § 103, is the Rejection of Claims 1, 3 through 6, 10, 12 through 15 and 19 as being unpatentable over Bajaj Proper?

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of establishing a **prima facie** case of obviousness. **In re Oetiker**, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). **See also In re Piasecki**, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). The Examiner can satisfy this burden by showing that some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art suggests the claimed subject matter. **In re Fine**, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the Appellants. **Oetiker**, 977 F.2d at 1445, 24 USPQ2d at 1444. **See also Piasecki**, 745 F.2d at 1472, 223 USPQ at 788. Thus, the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion.

However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. ***In re Kahn***, 441 F.3d 977, 987-88, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) citing **In re Kotzab**, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). See also **In re Thrift**, 298 F.3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002).

An obviousness analysis commences with a review and consideration of all the pertinent evidence and arguments. "In reviewing the [E]xaminer's decision on appeal, the Board must necessarily weigh all of the evidence and argument." **Oetiker**, 977 F.2d at 1445, 24 USPQ2d at 1444. "[T]he Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion." **In re Lee**, 277 F.3d 1338, 1344, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002).

With respect to representative claim 1, Appellants argue in the Appeal and Reply Briefs that Bajaj does not teach claimed invention. Particularly, Appellants assert that Bajaj does not

teach the limitation of multiplexing a plurality of coded mesh components into a compressed bit stream for subsequent transmission. We have already addressed this argument in the discussion of claim 1 above, and we disagree with Appellants. Further, Appellants argue that neither the Bajaj patent nor the priority document discloses the limitation of independently decoding and incrementally reproducing the mesh components as unit mesh parts of a 3D mesh.

In order for us to decide the question of obviousness, "[t]he first inquiry must be into exactly what the claims define." **In re Wilder**, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970). "Analysis begins with a key legal question-- what is the invention claimed ?"...Claim interpretation...will normally control the remainder of the decisional process." **Panduit Corp. v. Dennison Mfg.**, 810 F.2d 1561, 1567-68, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987), **cert denied**, 481 U.S. 1052 (1987).

We note that representative claim 1 reads in part as follows:

> [c]oding each of the plurality of mesh components, wherein the plurality of coded mesh components are capable of being independently decoded and incrementally reproduced as unit mesh parts of the 3-D mesh.

We note that at page 8, line 22 through 29, Appellants' specification states the following:

> [I]n this embodiment shown in FIG. 5 information genterated by any one coder is ot used in the other coders. That is, after MOL1 through MOSN 402 are generated from the 3-D mesh object (MO)100 by the 3-D MOL analyzer 401, they are compressed, transmitted, decoded and reconstructed respectively by the independent coders/decoders 403. Here, each of the coders and decoders includes an MCOM analyzer, so that each can divide a MOL into MCOMs and code/decode them. Information 404 decoded by the decoders is independent MOL data, so a 3-D mesh 405 is reconstructed by simply collecting this information.

Thus, the claim does require independently decoding and incrementally reproducing the mesh components as unit mesh parts of a 3D mesh.

Now, the question before us is what Bajaj would have taught to one of ordinary skill in the art? To answer this question, we find these additional facts:

1. At column 4, lines 3 through 13, Bajaj states the following:

> [T]he geometric primitives for the two basic kinds of contours, vertex and triangle, are encoded independently and alternately. In a specific illustrative embodiment, connectivity information is expressed by defining a novel kind of triangle strip, created by an existing layered decomposition method. All vertices are grouped into divided into a set **of contours and** possibly some isolated vertices**,** separate layers; and each vertex layer is further A "generalized" triangle strip is the basic geometric primitive, and represents the set of triangles that lie between two adjacent vertex layers. Large numbers of long generalized triangle strips are developed.

2. At page 88, the Bajaj priority document states the following:

> [T]he geometry of each contour is encoded separately. Only the geometry of non-branching vertices in a contour is encoded. Recall the fact that every branching vertex appears in more than one contour. So, in order to avoid encoding a branch vertex multiple times, we encode every branch vertex separately, independent of any contour it is located.

With the above discussion in mind, we find that with regard to representative claim 1, the Bajaj patent teaches a method and system for encoding 3D mesh information. Particularly, as depicted in figures 10, 3(a) through 3(c), Bajaj teaches the decomposition of a 3D object into a plurality of triangular meshes, each corresponding to a different partition of the 3D object, and each triangular mesh being encoded into a compressed bit stream for transmission, wherein each mesh partition is independently encoded. We also find that the Bajaj priority document does disclose such independent encoding of the mesh partitions. See priority document at page 88 (textual portions reproduced hereinabove). It is our view that one of ordinary skill in the art at the time of the present invention would have readily found that Bajaj's teaching of separately and independently encoding the different triangular meshes of a partitioned 3D object to thereby reconstruct the 3D object after transmission gives rise to the claimed independent decoding of the coded mesh components. The ordinarily skilled artisan would have found it logical that Bajaj's independent encoding of the bit streams leads to a similar decoding of the bit streams, in

light of the fact that decoding is the inverse process of encoding. In other words, albeit Bajaj does not particularly disclose that the decoding of each encoded bit streams is done independently, the ordinarily skilled artisan would have aptly recognized that the encoded meshes that form the bit streams should be decoded in an independent manner as well.

Regarding Appellants' new line of arguments presented at the Oral Hearing that Bajaj teaches away from the claimed invention by teaching a decoding scheme where the decoding of a subsequent mesh depends upon the decoding of a previous mesh, we are not persuaded by Appellants' arguments. It has been held that "[a] reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." **In re Gurley**, 27 F.3d 551, 53, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). It has also been held that teaching an alternative or equivalent method does not teach away from the use of a claimed method. **In re Dunn**, 349 F.2d 433, 438, 146 USPQ 479, 483 (CCPA 1965). In this case, we find that Bajaj's disclosure does not teach away from the claimed invention. At the time of the invention, the ordinarily skilled artisan would have looked to Bajaj's teaching of independently encoding the meshes before transmission to arrive to a scheme for independently

decoding the meshes since decoding is the inverse process of encoding. Consequently, we do not find error in the Examiner's stated position, which concludes that Bajaj teaches the limitation of independently decoding and incrementally reproducing the mesh components as unit mesh parts of a 3D mesh.

It is therefore our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would have suggested to the ordinarily skilled artisan the invention as set forth in claims 1, 3 through 6, 10, 12 through 15 and 19. Accordingly, we will sustain the Examiner's rejection of claims 1, 3 through 6, 10, 12 through 15 and 19.

CONCLUSION

In view of the foregoing discussion, we have sustained the Examiner's decision rejecting claim 2 under 35 U.S.C. § 102. We have also sustained the Examiner's decision rejecting claims 1, 3 through 6, 10, 12 through 15 and 19 under 35 U.S.C. § 103. Therefore, we affirm.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

ERROL A. KRASS
Administrative Patent Judge

ALLEN R. MACDONALD
Administrative Patent Judge

JEAN R. HOMERE
Administrative Patent Judge

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BUCHANAN INGERSOLL, PC
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313,1404